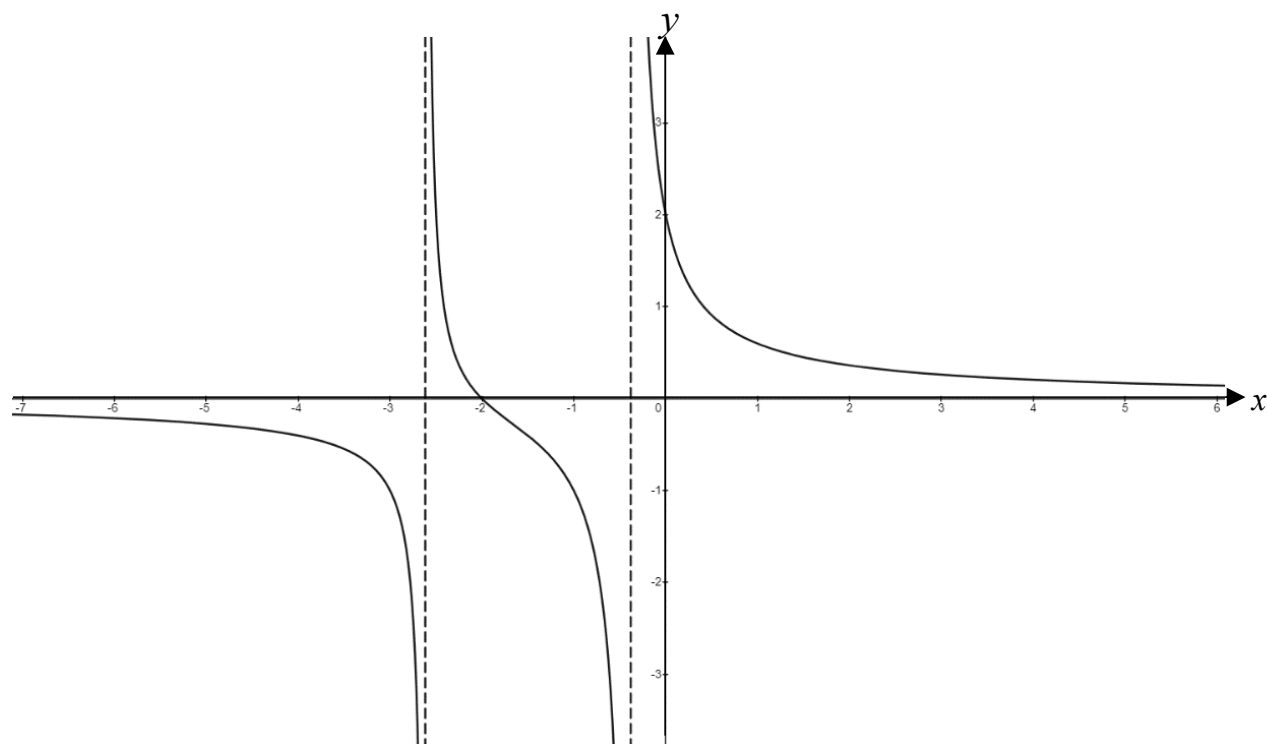
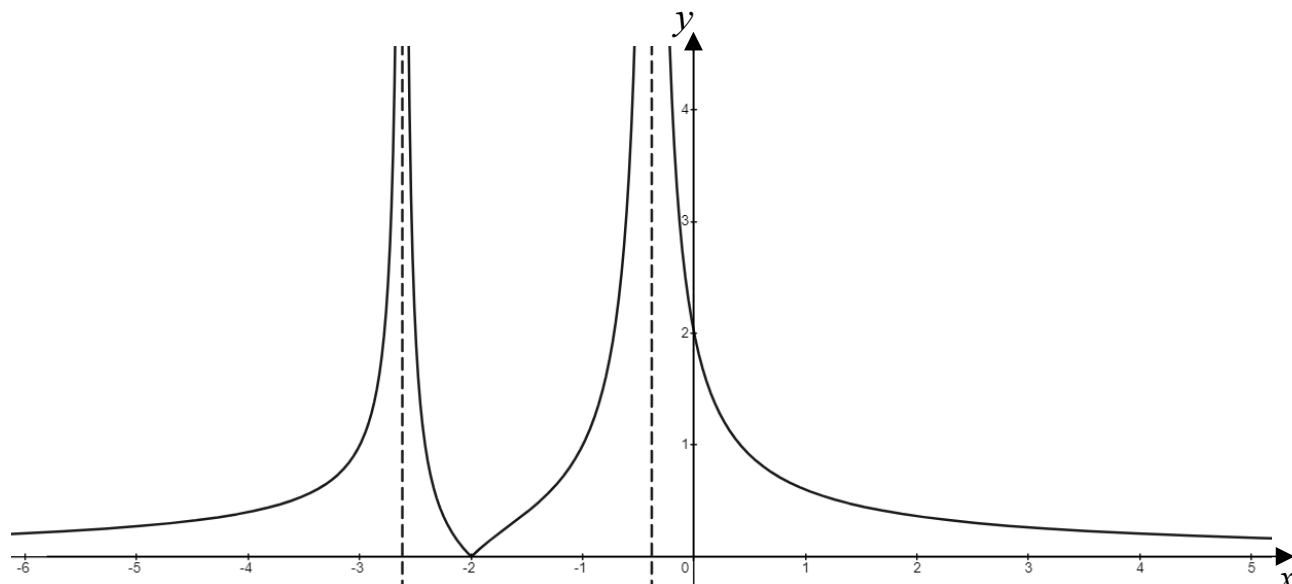


4(a)	$y = 2x + 1 \Rightarrow x = \frac{1}{2}(y - 1)$
	$\frac{1}{16}(y-1)^4 + \frac{1}{8}(y-1)^3 + \frac{1}{4}(y-1)^2 + \frac{1}{2}(y-1) + 1 = 0$ $\frac{1}{16}(y^4 - 4y^3 + 6y^2 - 4y + 1) + \frac{1}{8}(y^3 - 3y^2 + 3y - 1) + \frac{1}{4}(y^2 - 2y + 1) + \frac{1}{2}(y - 1) + 1 = 0$
	$\frac{1}{16}y^4 - \frac{1}{8}y^3 + \frac{1}{4}y^2 + \frac{1}{8}y + \frac{11}{16} = 0 \Rightarrow y^4 - 2y^3 + 4y^2 + 2y + 11 = 0$
4(b)	$S_2 = 2^2 - 2(4)$
	$S_2 = -4$
4(c)	$S_4 - 2S_3 + 4S_2 + 2S_1 + 44 = 0$
	$S_4 = -76$
7(a)	$x = -\frac{3}{2} - \frac{1}{2}\sqrt{5}, \quad x = -\frac{3}{2} + \frac{1}{2}\sqrt{5}$
	$y = 0$
7(b)	$\frac{dy}{dx} = \frac{(x^2 + 3x + 1)(1) - (x + 2)(2x + 3)}{(x^2 + 3x + 1)^2}$
	$x^2 + 4x + 5 = 0$
	Discriminant is $4^2 - 20 = -4 < 0$ so no real roots.

7(c)



7(d)



7(e)

$$\frac{x+2}{x^2+3x+1} = 2 \text{ or } \frac{x+2}{x^2+3x+1} = -2$$

$$-2x^2 - 5x = 0 \text{ or } 2x^2 + 7x + 4 = 0$$

$$x = -\frac{5}{2}, \quad x = 0 \text{ or } x = -\frac{7}{4} - \frac{1}{4}\sqrt{17}, \quad x = -\frac{7}{4} + \frac{1}{4}\sqrt{17}$$

$$-\frac{7}{4} - \frac{1}{4}\sqrt{17} < x < -\frac{5}{2}, \quad -\frac{7}{4} + \frac{1}{4}\sqrt{17} < x < 0, \quad x \neq -\frac{3}{2} \pm \frac{1}{2}\sqrt{5}$$

5(a)(i)	$\cos\left(\frac{1}{4}\pi - \frac{1}{6}\pi\right) = \cos\left(\frac{1}{4}\pi\right)\cos\left(\frac{1}{6}\pi\right) + \sin\left(\frac{1}{4}\pi\right)\sin\left(\frac{1}{6}\pi\right)$ $= \frac{1}{4}\sqrt{2}\sqrt{3} + \frac{1}{4}\sqrt{2} = \frac{1}{4}(\sqrt{6} + \sqrt{2})$
5(a)(ii)	$\sin\left(\frac{1}{4}\pi - \frac{1}{6}\pi\right) = \sin\left(\frac{1}{4}\pi\right)\cos\left(\frac{1}{6}\pi\right) - \cos\left(\frac{1}{4}\pi\right)\sin\left(\frac{1}{6}\pi\right)$ $= \frac{1}{4}\sqrt{2}\sqrt{3} - \frac{1}{4}\sqrt{2} = \frac{1}{4}(\sqrt{6} - \sqrt{2})$
5(b)	Reflection and rotation.
	Correct order.
	Reflection in the x -axis.
	A rotation, $\frac{1}{12}\pi$ [anticlockwise] about the origin.

5(c)

$$\begin{pmatrix} \frac{1}{4}(\sqrt{6} + \sqrt{2}) & \frac{1}{4}(\sqrt{2} - \sqrt{6}) \\ \frac{1}{4}(\sqrt{6} - \sqrt{2}) & \frac{1}{4}(\sqrt{6} + \sqrt{2}) \end{pmatrix}^{-1} = \begin{pmatrix} \frac{1}{4}(\sqrt{6} + \sqrt{2}) & \frac{1}{4}(\sqrt{6} - \sqrt{2}) \\ \frac{1}{4}(\sqrt{2} - \sqrt{6}) & \frac{1}{4}(\sqrt{6} + \sqrt{2}) \end{pmatrix},$$

$$\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}^{-1} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

$$\mathbf{M}^{-1} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} \frac{1}{4}(\sqrt{6} + \sqrt{2}) & \frac{1}{4}(\sqrt{6} - \sqrt{2}) \\ \frac{1}{4}(\sqrt{2} - \sqrt{6}) & \frac{1}{4}(\sqrt{6} + \sqrt{2}) \end{pmatrix}$$

5(d)

$$\mathbf{M} = \begin{pmatrix} \cos\left(\frac{\pi}{12}\right) & \sin\left(\frac{\pi}{12}\right) \\ \sin\left(\frac{\pi}{12}\right) & -\cos\left(\frac{\pi}{12}\right) \end{pmatrix}$$

$$\begin{pmatrix} \cos\left(\frac{\pi}{12}\right) & \sin\left(\frac{\pi}{12}\right) \\ \sin\left(\frac{\pi}{12}\right) & -\cos\left(\frac{\pi}{12}\right) \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} \cos\left(\frac{\pi}{12}\right)x + \sin\left(\frac{\pi}{12}\right)y \\ \sin\left(\frac{\pi}{12}\right)x - \cos\left(\frac{\pi}{12}\right)y \end{pmatrix}$$

$$\sin\left(\frac{\pi}{12}\right)x - m \cos\left(\frac{\pi}{12}\right)x = m \left(\cos\left(\frac{\pi}{12}\right)x + \sin\left(\frac{\pi}{12}\right)mx \right)$$

$$\sin\left(\frac{\pi}{12}\right)m^2 + 2m \cos\left(\frac{\pi}{12}\right) - \sin\left(\frac{\pi}{12}\right) = 0$$

$$m = \frac{-2 \cos\left(\frac{\pi}{12}\right) \pm \sqrt{4 \cos^2\left(\frac{\pi}{12}\right) + 4 \sin^2\left(\frac{\pi}{12}\right)}}{2 \sin\left(\frac{\pi}{12}\right)}$$

$$m = -\cot\left(\frac{\pi}{12}\right) \pm \operatorname{cosec}\left(\frac{\pi}{12}\right)$$